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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/679,480	10/05/2000	Yasuo Suzuki	197484US0	7558

22850 7590 05/02/2005

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EXAMINER	
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ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 05/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/679,480	SUZUKI ET AL.	
	Examiner	Art Unit	
	Janis L. Dote	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-7,10,11,15-17,20,24-26,29,33-35 and 38-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-7,10,11,15-17,20,24-26,29,33-35 and 38-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/29/04; 4/18/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The examiner acknowledges the amendments to claims 1, 10, 20, 29, and 46, and the addition of claim 48 set forth in the amendment filed on Jan. 31, 2005. Claims 1, 5-7, 10, 11, 15-17, 20, 24-26, 29, 33-35, and 38-48 are pending.

2. The examiner has considered the copending US applications listed in the "List of related cases" in the Information Disclosure Statements filed on Nov. 29, 2004, and Apr. 18, 2005.

3. The rejections of claim 46 under 35 U.S.C. 103(a) over Japanese Patent 8-029998 combined with Japanese Patent 07-295250 and US 5,763,125 (Kawata), and over Japanese Patent 7-128890 combined with JP'250 and Kawata, set forth in the office action mailed on Sep. 29, 2004, paragraphs 10 and 17, respectively, have been withdrawn in response to the amendment filed on Jan. 31, 2005, to claim 46, requiring the intermediate layer to be coated on an aluminum drum having a drum diameter of 30 mm. None of the cited references teaches such an aluminum drum. As discussed in paragraph 10, Kawata teaches a cylindrical substrate comprising a base made of a fiber-reinforced plastic having a diameter of 30 mm coated with a conductive resin layer.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 5-7, 10, 11, 15-17, 20, 24-26, 29, 33-35, and 38-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 10, 20, and 29 are indefinite in the phrase "from 0.1 to 5 parts by weight of an organic sulfur-containing compound, based on 100 parts of a charge transport material" because it is not clear to what the "100 parts" is based on, e.g., weight, mole, volume, etc.

Claim 46 is indefinite in the phrase "coating an intermediate layer coating liquid on a peripheral surface of an aluminum drum having a drum diameter of 30 mm" for lack of unambiguous antecedent basis in the claim 1. Claim 1 does not recite the presence of an aluminum drum, but merely recites an electroconductive substrate. It is not clear whether the aluminum drum is the electroconductive substrate recited in instant claim 1 or another component of the photoreceptor.

Claim 48 is indefinite in the phrase "said intermediate layer has a thickness of 0 to 10 μm." Claim 1, from which claim 48 depends, recites a photoreceptor comprising an intermediate layer. It is not clear how an intermediate having a thickness of 0 μm can still be present in the photoreceptor. It therefore is not clear whether claims 1 and 48 require the presence of an intermediate layer or whether the intermediate layer is merely an optional component.

Applicants' arguments filed on Jan. 31, 2005, with respect to the rejection of claim 46 have been fully considered but they are not persuasive.

Applicants assert that the amendment filed on Jan. 31, 2005, to claim 46 overcomes the rejection.

However, for the reasons discussed in the above rejection, the amendment to claim 46 did not overcome the rejection. Claim 46 does not positively recite that the electroconductive substrate of claim 1 is the aluminum drum recited in claim 46.

6. In the interest of compact prosecution, the examiner has interpreted the claim language "100 parts of a charge transport material" in the phrase "from 0.1 to 5 parts by weight of an organic sulfur-containing compound, based on 100 parts of a

charge transport material" recited in instant claims 1, 10, 20, and 29 to be based on "weight."

The examiner has also interpreted the claim language "aluminum drum" recited in instant claim 46 as referring to the electroconductive substrate recited in instant claim 1.

The examiner has interpreted the claim language recited in instant claims 1 and 48 as not requiring the presence of an intermediate layer.

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1, 5, 38, 39, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent 8-029998 (JP'998) combined with Japanese Patent 07-295250 (JP'250). See the DERWENT machine-assisted translations of JP'998 and JP'250, and the Japanese Patent Office (JPO) machine-assisted translation of JP'998 for cites.

JP'998 discloses an electrophotographic photoreceptor comprising a conductive aluminum drum having a diameter of 80 mm, an intermediate layer, a charge generation layer, and a charge transport layer. The charge generation layer comprises 3 parts by weight of a τ-form metal-free phthalocyanine pigment

and 3.5 parts by weight of the asymmetric bisazo pigment (I-24) that meets the limitations of formula (VII) recited in instant claim 38. DERWENT translation, Table 1B(6), compound (I)-24; paragraphs 0035 and 0042; and example 8 in paragraph 0047. The weight ratio of phthalocyanine pigment to bisazo pigment is 3:3.5, which is within the range of 1:5 to 5:1 recited in instant claim 1. The intermediate layer has a layer thickness of 0.1 μm, which meets the layer thickness range of 0 to 10 μm recited in instant claim 48. See the JPO translation, paragraph 0035, lines 4-5. (Note that the DERWENT translation of paragraph 0035 is missing the text in lines 4-5 of the JPO translation.) JP'998 also discloses that the asymmetric bisazo pigment can equally be the asymmetric bisazo pigment (I-29), which meets the limitations of formula (VIII) recited in instant claim 39. See the DERWENT translation, Table 1-(7), compound (I)-29; paragraph 0043; and example 9, paragraph 0047. According to JP'998, its photoreceptor has high spectral sensitivity in the visible light to the near infrared region. DEWENT translation, paragraph 0004.

JP'998 does not exemplify a photoreceptor comprising an intermediate layer comprising titanium oxide as recited in the instant claims. However, JP'998 discloses that a fine-powder pigment of a metallic oxide, such as titanium oxide, may be

added to the binder resin of its intermediate layer to prevent the occurrence of moire and to reduce the residual electric potential of the photoreceptor. DERWENT translation, paragraph 0030. These are the same benefits sought by applicants. See the instant specification, page 31, lines 9-11.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'998, to add the metal pigment titanium oxide to the intermediate layer in the photoreceptor disclosed by JP'998 because that person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that prevents the occurrence of moire and exhibits a reduction in residual electric potential.

JP'998 also does not disclose that the charge transport layer comprises a sulfur-containing compound as recited in the instant claims. However, JP'998 discloses that the charge transport layer can comprise an antioxidant. DERWENT translation, paragraph 0027.

JP'250 discloses sulfur-containing compounds that meet the compositional limitations of formulas (III), (S-1), (S-2), and (S-3) recited in the instant claims. JP'250 discloses that said sulfur-containing compounds can be used as antioxidants in charge transport layers of photoreceptors. DERWENT translation,

paragraph 0007, compounds (I-1) to (I-4) at paragraph 0026, compounds (II-1) to (II-3) at paragraph 0028. JP'250 exemplifies a charge transport layer comprising 1.5 parts by weight of the sulfur-containing antioxidant per 100 parts by weight of the charge transport material. The amount of 1.5 parts by weight was determined from the information provided in the DERWENT translation, paragraph 0050. The amount of 1.5 parts by weight per 100 parts by weight of the charge transport material is within the range of "0.1 to 5 parts by weight . . . based on 100 parts [by weight]" of the charge transport material recited in instant claim 1. JP'250 discloses that said sulfur-containing compounds prevent the deterioration of the photoreceptor due to ozone in the ambient air or due to strong light irradiation. The photoreceptor is said to have improved potential stability over long periods of time. DERWENT translation, paragraphs 0003, 0006,0007, and paragraph 0054, lines 1-4. JP'250 further teaches that its sulfur-containing antioxidants provide photoreceptors with improved stability of electrification and sensitivity over long periods of time compared to known hindered phenol antioxidants. DERWENT translation, Table 1, comparative examples 3 and 4, and paragraph 0054, lines 14-18.

It would have been obvious for a person having ordinary skill in the art to use JP'250's sulfur-containing compound that meets the compositional limitation of formulas (III), (S-1), (S-2), or (S-3) recited in the instant claims, in an amount of 1.5 parts by weight per 100 parts by weight of the charge transport material in the charge transport layer, as the antioxidant in the photoreceptor rendered obvious over the teachings of JP'998, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor that has improved potential stability over long periods of time and provides stable toner images after many repeated copies.

9. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250 as applied to claim 1 above, further combined with additional teachings in JP'998. See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

Claim 47 is rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 9, which is incorporated herein by reference.

10. Claims 10, 11, 15, 20, 24, 29, 33, and 40-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998

combined with JP'250, as applied to claims 1, 5, 38, and 39 above, further combined with US 5,047,803 (Kanoto). See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

The claims are rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 11, which are incorporated herein by reference.

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250, as applied to claim 5 above, further combined with US 4,507,374 (Kakuta) and DERWENT abstract Acc. No. 1983-816039. See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

Claim 6 is rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 12, which are incorporated herein by reference.

12. Claims 16, 25, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250 and Kanoto, as applied to claim 15, 24, and 33 above, further combined with Kakuta and DERWENT abstract Acc. No. 1983-816039.

See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

The claims are rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 13, which are incorporated herein by reference.

13. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250 as applied to claim 1 above, further combined with US 5,250,990 (Fujimura) and US 4,987,046 (Kutami). See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

JP'998 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 8 above, which is incorporated herein by reference.

JP'998 does not exemplify a photoreceptor comprising an electroconductive drum having a diameter of 30 mm as recited in instant claim 46. However, JP'998 does not limit the type of electroconductive substrate used. JP'998 discloses that the electroconductive substrate can be an aluminum pipe. DERWENT translation, paragraph 0017. As discussed in paragraph 8 above, JP'998 exemplifies the use of an aluminum drum.

According to Fujimura, "seamless cylindrical substrate [i.e., the drum]" for photoconductive members is attracting

attention in recent years because the electrophotographic apparatuses comprising said photoconductors is simple to make, low in cost and compact, and the photoconductive members can be made smaller. Fujimura, col. 1, lines 52-57. Fujimura also discloses that "in recent years, with the process of miniaturization of electrophotographic apparatus, it has been desired to develop a space-saving type electrophotographic apparatus which is inexpensive and transportable, directed to individual use . . . an apparatus using a drum with a small diameter and a blade cleaning system, is most suitable." Fujimura, col. 1, lines 59-66.

According to Kutami, prior art aluminum drum bases made by extrusion and machining the surface of said extruded drums or made by a drawing and ironing process have shortcomings, e.g., high manufacturing costs, poor productively, or the inability to form photoreceptors having the required length of 210 mm with a drum diameter of less than 40 mm. Kutami, col. 1, lines 13-57. Kutami teaches an electrically conductive aluminum drum for use in electrophotographic photoreceptors, which is lightweight and thin-walled. The drum can be continuously manufactured at a low cost without any restriction of the length thereof. Thus, the drum is free of the above-mentioned shortcomings of the conventional drums used in electrophotographic photoreceptors.

Col. 1, lines 60-68. Kutami further discloses that the dimensional accuracy of the drum is remarkably high, and the photoreceptors comprising said drum as the electrically conductive base provide clear images uniformly without any abnormalities due to the flaw and joint on the surface of the photoconductive drum. Col. 14, lines 48-53. The Kutami aluminum drum is obtained by forming an aluminum sheet in the form of a tube having a seam and welding the seam of the tube by resistance welding to form an "electroseamed" tube. The aluminum tube has an outer diameter of 30 mm and a length of 260 mm. Col. 2, lines 34-41; and example 1 at col. 7, line 61, to col. 8, line 5.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Fujimura and Kutami, to use the aluminum drum as taught by Kutami as the electroconductive substrate in the photoreceptor rendered obvious over the combined teachings of JP'998 and JP'250. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that is easily manufactured, light in weight, that has high dimensional accuracy, and that is small in size, to be used in miniaturized space-saving electrophotographic devices, and that provides clear images uniformly without any abnormalities due to the flaw

and joint on the surface of the photoconductive drum, as discussed by Kutami.

14. Applicants' arguments filed on Jan. 31, 2005, with respect to the rejections over JP'998 combined with JP'250, set forth in paragraphs 8-13 above, have been fully considered but they are not persuasive.

Applicants assert JP'250 does not teach the asymmetric bisazo pigment or the intermediate layer recited in instant claim 1. Applicants also assert that JP'998 does not teach the sulfur-containing compound recited in instant claim 1.

However, as discussed in rejection in paragraph 8 above, the combined teachings of JP'998 and JP'250 render obvious a photoreceptor that meets all the limitations recited in instant claims 1, 10, 20, and 29. Applicants cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Accordingly, for the reasons discussed in the rejections in paragraphs 8-13 above, the instantly claimed invention is rendered prima facie obvious over the combined teachings in the prior art.

Applicants further assert that the showing in the instant specification and the showing in the Rule 132 declaration, executed by Yasuo Suzuki on May 21, 2004, filed on May 27, 2004, show that the instantly claimed invention yields unexpected superior results over the prior art.

However, the showings in the instant specification and in the declaration are insufficient to overcome the rejections because they do not to show that the instantly claimed invention yields unexpected results over the prior art of JP'998 for the following reasons:

(1) The showing in the instant specification and in the declaration is not commensurate in scope with the instant claims. The evidence in the instant specification and in the declaration is insufficient to show that the full scope of the instant claims yields unexpected results over the prior art.

The instant specification exemplifies preferred photoreceptors comprising preferred aluminum drums having a diameter of 30 mm and a preferred intermediate layer having a thickness of 3 μm. See instant claims 46 and 47; and examples 5 through 16 in the instant specification. (Contrary to applicants, examples 1-4 are outside the scope of instant claims 1, 10, 20, and 29 because they include a symmetric bisazo pigment or a symmetric bisazo compound and a triazo pigment.)

The photoreceptors exemplified in examples 5-16 also comprise a charge transfer layer comprising 0.9 parts by weight of the particular organic sulfur-containing antioxidant S-1, S-2, S-3, III-3, III-4, or III-6 based on 100 parts by weight the of the charge transfer material.

The declaration exemplifies photoreceptors comprising aluminum drums having a diameter of 80 mm, an intermediate layer having a thickness of 4.5 μm, and a charge transfer layer comprising 0.9 parts by weight of the particular organic sulfur-containing antioxidant S-1, III-3, or III-6 based on 100 parts by weight the of the charge transfer material. See examples A through C.

(a) The instant claims recite that the organic sulfur-containing compound is present in an amount of 0.1 to 5 parts by weight based on 100 parts of the charge transport material. The instant claims do not limit the amount of the organic sulfur-containing compound to be only 0.9 parts by weight per 100 parts by weight of the charge transport material, as exemplified in the instant specification and declaration. The limited showing of only one amount does not exemplify the full scope of the amounts recited in the instant claims. Thus, applicants' showing is not commensurate with the scope of the exclusion protection they seek.

(b) In the declaration, the photoreceptors that comprise aluminum drums having a diameter of 80 mm and an intermediate layer of 4.5 μm only show the use of organic sulfur-containing antioxidant S-1 and those antioxidants representative of formula III recited in the instant claims. The declaration shows that photoreceptors comprising organic sulfur-containing antioxidants of formula III provide 200,000 images with no black spots, while black spots were observed after 173,000 copies using a photoconductor comprising organic sulfur-containing antioxidant S-1. When no organic sulfur-containing antioxidant is used, black spots were observed after 105,000 copies. See declaration, Table A, examples A-C, and comparative example A. The difference between 173,000 and 105,000 is about 39%. The declaration does not exemplify photoreceptors comprising an aluminum drum having a drum diameter of 80 mm, an intermediate layer of 4.5 μm, and the organic sulfur-containing antioxidants S-2 and S-3 recited in the instant claims. Moreover, antioxidants S-2 and S-3 are not similar to those of formula III. Although antioxidants S-2 and S-3 appear to be related the antioxidant S-1, there is no evidence on the present record showing that photoreceptors comprising antioxidants S-2 and S-3 provide the same results as shown in the declaration

from photoreceptors comprising antioxidants S-1 and those representative of formula III.

In the response filed on Jan. 31, 2005, applicants assert that the instant specification shows that "superior results are obtained with compounds III, S-1, S-2, and S-3, thereby rebutting the Examiner's assertion that 'there is no evidence on the present record showing that photoreceptors comprising antioxidants S-2 and S-3 provide the same results as shown in the declaration.'"

However, as discussed supra, the photoreceptors in examples 6-16 of the instant specification comprise a preferred aluminum drum having a diameter of 30 mm and a preferred intermediate layer having a layer thickness of 3 μm. The instant specification does not exemplify photoreceptors comprising an aluminum drum having a drum diameter of 80 mm and an intermediate layer having a layer thickness of 4.5 μm, as exemplified in the declaration. Thus, the showing in the instant specification does not show that photoreceptors comprising an aluminum drum having a drum diameter of 80 mm, an intermediate layer having a layer thickness having a layer thickness of 4.5 μm, and the antioxidant compound S-2 or S-3 provide the same results as the photoreceptors A through C in the declaration. Accordingly, there is no evidence on the

present record showing that photoreceptors having an aluminum drum having a drum diameter of 80 mm and an intermediate layer having a layer thickness of 4.5 μm, and comprising antioxidants S-2 or S-3 provide the same results as shown in the declaration from photoreceptors comprising antioxidants S-1 and those representative of formula III.

(c) As discussed in the office action mailed on Sep. 29, 2004, pages 22 and 23, the specification and declaration do not show that the results are independent of the intermediate layer thickness as alleged by applicants. The specification exemplifies photoreceptors comprising a preferred aluminum drum having a diameter of 30 mm and only the preferred intermediate layer having a thickness of 3 μm. The declaration only exemplifies photoreceptors that comprise an aluminum drum having a diameter of 80 mm comprising only one intermediate layer having a thickness of 4.5 μm. A showing of only two layer thicknesses is insufficient to show that the alleged unexpected results in black spot formation are independent of the thickness of the intermediate layer. As discussed in the previous office action mailed on Aug. 27, 2003, paragraph 9, the Rule 132 declaration executed by Yasuo Suzuki on Jul. 4, 2002, filed on Jul. 8, 2002, attributes the differences in black spot formation between comparative examples 5 and 13 of the instant

specification and examples 8 and 15 of US 6,136,483 (Suzuki'483) to the differences in the thickness in the undercoat layer. The declarant states that "the underlayer layer, which is thicker in the Suzuki Examples (4.5 μm) than in the present Comparative Examples (3.0 μm), has a charge blocking property." The declarant further states that "the thicker the underlayer, the better the black spot formation." Thus, the thickness of the intermediate layer appears to be a critical element to the reduction of formation of black spots. However, independent claims 1, 10, 20, and 29 do not limit the layer thickness of the intermediate layer. In fact, instant claims 1 and 48 do not require an intermediate layer. The instant specification at page 31, lines 24-25, discloses that the intermediate layer may have a thickness of "0 to 10 μm." There is no evidence on the present record showing that photoreceptors that comprise a conductive drum having a diameter of 80 mm comprising an intermediate layer having a thickness other than 4.5 μm, such as 0.1 μm as exemplified in the prior art, provide unexpected results in reduced formation of black spots. Indeed, the declarant's testimony indicates the contrary might be expected to be true.

(2) The instant specification and the Rule 132 declaration do not compare adequately to JP'998.

Comparative examples 5, 9, and 13, which comprise a charge generation layer comprising an asymmetric bisazo pigment and a phthalocyanine pigment, comprise an aluminum drum having a drum diameter of 30 mm and an intermediate layer having a thickness of 3.0 μm. Comparative example A in the declaration comprises a drum having a diameter of 80 mm and an intermediate layer having a thickness of 4.5 μm.

As discussed supra, the intermediate layer thickness appears to be a critical element in the formation of images free from black spots. Instant independent claims 1, 10, 20, and 29 do not limit the thickness of the intermediate layer. In fact, instant claims 1 and 48 do not require an intermediate layer. The exemplification of an intermediate layer having a thickness of 3 μm or 4.5 μm is not commensurate in scope with the instant claims.

Furthermore, as discussed in the previous office action mailed on Aug. 27, 2003, paragraph 9, the Rule 132 declaration executed by Yasuo Suzuki on Jul. 4, 2002, filed on Jul. 8, 2002, attributes the differences in black spot formation between comparative examples 5 and 13 of the instant specification and examples 8 and 15 of US 6,136,483 (Suzuki'483) to also the differences in the photoreceptor drum diameter. The declarant states that "when Sukuzi's photoreceptor (having a diameter of

80 mm) produces 50,000 images [on A-4 paper], it revolves about 53,724 times," while the "photoreceptor used in the presence application revolves about 143,312 times to produce 50,000 images [on A-4 paper], because it has a diameter of 30 mm." The declarant further states that "the surface of the photoreceptor having a diameter of 30 mm is exposed to hazards by a factor of 2.67 times greater than that of the Suzuki photoreceptor having a diameter of 80 mm." The declarant states that "when black spots are observed after the 38,000th image in Comparative Examples of the present application, it is nearly equivalent to black spots being observed from about the 100,000th image in the Suzuki Examples." Thus, the diameter of the photoreceptor appears to also be a critical element in the formation of black spots. The exemplification of a drum diameter of 30 mm in examples in the instant specification is not commensurate in scope with the instant claims, which, except for claim 46, are not limited to any drum diameter.

As discussed in paragraph 8 above, JP'998 exemplifies photoreceptors comprising an aluminum cylinder having a diameter of 80 mm and an intermediate layer having a thickness of 0.1 μm. See DERWENT translation and JPO translation, examples 8 and 9 in paragraph 0047. The instant claims do not exclude the intermediate layer of 0.1 μm or the drum diameter of 80 mm. In

fact, instant claims 1 and 48 do not require an intermediate layer. The instant specification at page 31, lines 24-35, discloses that the intermediate layer may have a thickness ranging from 0 to 10 μm. The comparative examples do not exemplify such photoreceptors comprising drums having a diameter of 80 mm and an intermediate layer having a thickness of 0.1 μm. Accordingly, comparative examples 5, 9, and 13 in the instant specification and comparative example A in the declaration are not a probative comparison to JP'998.

Thus, given the welter of unconstrained variables and applicants' limited showings, applicants have not satisfied their burden to show that the full scope of the instantly claimed invention provides unexpected results over the prior art. Accordingly, the rejections over the combined teachings of JP'998 and JP'250 stand.

15. Claims 1, 5, 38, 39, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent 7-128890 (JP'890) combined with JP'250. See the DERWENT machine-assisted translations of JP'890 and JP'250 for cites.

JP'890 discloses an electrophotographic photoreceptor comprising a conductive aluminum drum having a diameter of 80 mm, an intermediate layer, a charge generation layer, and a

charge transport layer. The intermediate layer has a thickness of 0.1 μm. The charge generation layer comprises 2.5 parts by weight of an X-form metal-free phthalocyanine pigment and 3 parts by weight of the asymmetric bisazo pigment (I-24), which meets the limitations of formula (VII) recited in instant claim 38. Translation, Table 1B(6), compound (I)-24; paragraphs 0035 and 0042; and example 8 in paragraph 0047. (Note that the DERWENT translation paragraph 0042 incorrectly states that "3.0 weight parts and 2.5 weight-parts of X type metal-less phthalocyanines were added for the illustration compound (1)-24 disazo pigment." Paragraph 0042 in JP'890 states 3.0 weight parts of the compound (1)-24 and 2.5 weight parts of X type metal-less phthalocyanine are used to form the charge generation layer.) The weight ratio of phthalocyanine pigment to bisazo pigment is 2.5:3, which is within the range of 1:5 to 5:1 recited in instant claim 1. JP'890 also discloses that the asymmetric bisazo pigment can equally be the asymmetric bisazo pigment (I-29), which meets the limitations of formula (VIII) recited in instant claim 39. See the translation, Table 1-(7), compound (I)-29; paragraph 0043; and example 9, paragraph 0047. According to JP'890, its photoreceptor has high spectral sensitivity in the visible light to the near infrared region. Translation, paragraph 0004.

JP'890 does not exemplify a photoreceptor comprising an intermediate layer comprising titanium oxide as recited in the instant claims. However, JP'890 discloses that a fine-powder pigment of a metallic oxide, such as titanium oxide, may be added to the binder resin of its intermediate layer to prevent the occurrence of moire and to reduce the residual electric potential of the photoreceptor. Translation, paragraph 0030. These are the same benefits sought by applicants. See the instant specification, page 31, lines 9-11.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'890, to add the metal pigment titanium oxide to the intermediate layer in the photoreceptor disclosed by JP'890, because that person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that prevents the occurrence of moire and exhibits a reduction in residual electric potential.

JP'890 does not disclose that the charge transport layer comprises a sulfur-containing compound as recited in the instant claims.

JP'250 discloses sulfur-containing compounds that meet the compositional limitations of formulas (III), (S-1), (S-2), and (S-3) recited in the instant claims. JP'250 discloses that said

sulfur-containing compounds can be used as antioxidants in charge transport layers of photoreceptors. The discussion of JP'250 in paragraph 8, supra, is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art to use JP'250's sulfur-containing compound that meets the compositional limitation of formulas (III), (S-1), (S-2), or (S-3) recited in the instant claims in an amount of 1.5 parts by weight per 100 parts by weight of the charge transport material, as an antioxidant in the charge transport layer in the photoreceptor rendered obvious over the teachings of JP'890, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor that has improved potential stability over long periods of time and provides stable toner images after many repeated copies.

16. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250 as applied to claim 1 above, further combined with additional teachings in JP'890. See the DERWENT translations of JP'890 and JP'250 for cites.

Claim 47 is rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 16, which are incorporated herein by reference.

17. Claims 10, 11, 15, 20, 24, 29, 33, and 40-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250, as applied to claims 1, 5, 38, and 39 above, further combined with Kanoto. See the DERWENT translations of JP'890 and JP'250 for cites.

The claims are rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 18, which are incorporated herein by reference.

18. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250, as applied to claim 5 above, further combined with US 3,357,989 (Byrne). See the DERWENT translations of JP'890 and JP'250 for cites.

Claim 7 is rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 19, which are incorporated herein by reference.

19. Claim 17, 26, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250 and Kanoto,

as applied to claim 15, 24, and 33 above, further combined with Byrne. See the DERWENT machine-assisted translations of JP'890 and JP'250 for cites.

The claims are rejected for the reasons discussed in the office action mailed on Sep. 29, 2004, paragraph 20, which are incorporated herein by reference.

20. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250 as applied to claim 1 above, further combined with Fujimura and Kutami. See the DERWENT translations of JP'890 and JP'250 for cites.

JP'890 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 15 above, which is incorporated herein by reference.

JP'890 does not exemplify a photoreceptor comprising an electroconductive drum having a diameter of 30 mm as recited in instant claim 46. However, JP'890 does not limit the type of electroconductive substrate used. JP'890 discloses that the electroconductive substrate can be an aluminum drum. DERWENT translation, paragraph 0017. As discussed in paragraph 15 above, JP'890 exemplifies the use of an aluminum drum.

Fujimura discloses that compact and space-saving electrophotographic apparatus and smaller photoconductive

members can be obtained by using seamless cylindrical substrates as bases for the photoconductive members. Kutami teaches an electrically conductive aluminum drum base for electrophotographic photoreceptors having a drum diameter of 30 mm. The discussions of Fujimura and Kutami in paragraph 13 above are incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Fujimura and Kutami, to use the aluminum drum as taught by Kutami as the electroconductive substrate in the photoreceptor rendered obvious over the combined teachings of JP'850 and JP'250. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that is easily manufactured, light in weight, that has high dimensional accuracy, and that is small in size, to be used in miniaturized space-saving electrophotographic devices, and that provides clear images uniformly without any abnormalities due to the flaw and joint on the surface of the photoconductive drum, as discussed by Kutami.

21. Applicants' arguments filed on Jan. 31, 2005, with respect to the rejections over JP'890 combined with JP'250 set forth in

paragraphs 15-20 above have been fully considered but they are not persuasive.

Applicants assert that the Rule 132 declaration, executed by Yasuo Suzuki on May 21, 2004, filed on May 27, 2004, shows that the instantly claimed invention yields unexpected superior results over the prior art.

However, the showings in the instant specification and in the declaration are insufficient to overcome the rejections because they do not to show that the instantly claimed invention yields unexpected results over the prior art of JP'890 for the following reasons:

(1) The showings in the specification and the declaration are not commensurate in scope with the instant claims. The evidence in the specification and the declaration is insufficient to show that the full scope of the instant claims yields unexpected results over the prior art.

The declaration and the instant specification exemplify preferred photoreceptors comprising preferred aluminum drums having a diameter of 30 mm, and a preferred intermediate layer having a preferred thickness of 3 μm, a charge generation layer comprising X-form metal-free phthalocyanine, and a charge transfer layer comprising 0.9 parts by weight of the particular organic sulfur-containing antioxidant based on 100 parts by

weight the of the charge transfer material. See claims 46 and 47; the declaration, examples D-J; and the instant specification, examples 9-12.

As discussed in the previous office action mailed on Aug. 27, 2003, paragraph 9, which is incorporated herein by reference, the Rule 132 declaration executed by Yasuo Suzuki on Jul. 4, 2002, filed on Jul. 8, 2002, attributes the differences in black spot formation between examples comprising a drum having a diameter of 30 mm and an intermediate layer having a thickness of 3 μm and examples comprising a drum having a diameter of 80 mm and an intermediate layer having a thickness of 4.5 μm to:

(a) The difference in the layer thickness of the intermediate layer. As discussed in paragraph 14, item 1(c) above, the declaration states that the thicker layer has a charge blocking property, and that the "thicker the undercoat layer, the better the black spot formation."

(b) The differences in the photoreceptor drum diameter as discussed in paragraph 14, item (2) above.

Thus, both the diameter of the photoreceptor drum and the thickness of the intermediate layer appear to be critical elements in the prevention of formation of black spots.

Independent claims 1, 10, 20, and 29 do not recite these critical and preferred elements.

Moreover, for the reasons discussed in paragraph 14, item 1(a) with respect to the amount of organic sulfur-containing antioxidant, the showings in the declaration and the instant specification are not commensurate in scope with the instant claims of the specification.

(2) The instant specification and the Rule 132 declaration do not compare adequately to JP'890. Comparative examples B and F in the declaration comprise a drum having a diameter of 30 mm and an intermediate layer having a thickness of 3.0 μm. Comparative examples 9-12 in the instant specification comprise a drum having a diameter of 30 mm and an intermediate layer having a thickness of 3.0 μm. (Contrary to applicants, comparative examples 13-16 comprise a τ-metal free phthalocyanine, not an X-form metal free phthalocyanine as exemplified in JP'890 and in instant example 9.) As discussed supra, the intermediate layer thickness of 3 μm and the drum diameter of 30 mm are preferred elements and they also appear to be critical elements in the formation of images free from black spots. Instant independent claims 1, 10, 20, and 29 do not limit the thickness of the intermediate layer, or the diameter of the electroconductive drum. Claims 1, 10, 20, and 29 merely

recite the presence of "an electroconductive substrate." The exemplification of a drum having a diameter of 30 mm and an intermediate layer having a thickness of 3 μm is not commensurate in scope with the instant claims. As discussed in paragraph 15 above, JP'890 exemplifies photoreceptors comprising an aluminum cylinder having a diameter of 80 mm, and an intermediate layer having a thickness of 0.1 μm. See DERWENT translation, examples 8 and 9 in paragraph 0047. The instant independent claims do not exclude the JP'890 drum having a diameter of 80 mm or an intermediate layer of 0.1 μm. In fact, instant claims 1 and 48 do not require an intermediate layer. The instant specification at page 31, lines 24-35, discloses that the intermediate layer may have a thickness ranging from 0 to 10 μm. The comparative examples in the instant specification and in the declaration do not exemplify such photoreceptors comprising drums having a diameter of 80 mm and an intermediate layer having a thickness of 0.1 μm. Accordingly, comparative examples B and F of the declaration and comparative examples 9-12 of the instant specification are not probative comparisons to JP'890.

Thus, given the welter of unconstrained variables and applicants' limited showings, applicants have not satisfied their burden to show that the full scope of the instantly

claimed invention provides unexpected results over the prior art. Accordingly, the rejections over the combined teachings of JP'890 and JP'250 stand.

22. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Mark Huff, can be reached on (571) 272-1385. The central fax phone number is (703) 872-9306.

Any inquiry regarding papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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JLD
Apr. 25, 2005